MICHAEL L. PARKS

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Sandia National Laboratories
Computational Mathematics and Algorithms Department
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EDUCATION

Ph.D., Computer Science, May 2005
University of Illinois at Urbana-Champaign, Urbana, IL.
GPA: 3.92/4.00
Completed CSE degree option (demonstrating proficiency in numerical computation)

The Iterative Solution of a Sequence of Linear Systems Arising From Nonlinear Finite Element Analysis
Eric de Sturler (chair), Michael T. Heath, Paul E. Saylor, Keith D. Hjelmstad

M.S., Computer Science, May 2000
Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, VA.
GPA: 3.96/4.00

Efficient Numeric Computation of a Phase Diagram in Biased Diffusion of Two Species
Calvin J. Ribbens (chair), Donald Allison, Royce K. P. Zia, Beate Schmittmann

B.S., Computer Science, Summa Cum Laude, May 1998
B.S., Physics, Summa Cum Laude, In Honors, May 1998
Minor: Mathematics
Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, VA.
GPA: 3.87/4.00

The Construction and Analysis of Factorial Experiments: Application to Tribochemical Vapor Deposition
Honors Thesis (Physics)
Jimmy Ritter (chair), Beate Schmittmann, Jerome Long

RESEARCH AND TECHNICAL EXPERIENCE

Postdoctoral Employee, Computational Mathematics and Algorithms Dept., Sandia National Laboratories, Fall 2004 – Present
Conducting research in multiscale modeling and analysis

Research Assistant, Dept. of Computer Science, University of Illinois, Spring 2001 – Fall 2004
Developing new solvers and preconditioners for ill-conditioned sparse linear systems

Applications Programmer, Dept. of Physics, Virginia Tech, Summer 1998
Constructed custom interactive laboratory software for use in undergraduate physics labs

Research Assistant, Dept. of Physics, Virginia Tech, 1996 – 97
Developed software to drive experimental apparatus; Aided in experiment design, data collection, and analysis

TEACHING EXPERIENCE

Instructor, Dept. of Computer Science, Virginia Tech, Summer 1999
Taught Object-Oriented Software Design and Construction course (60 students)
Managed teaching assistants
Prepared lectures, homework, programming assignments, and exams

Teaching Assistant, Dept. of Computer Science, University of Illinois, Fall 2000
Graded assignments and exams, held office hours
Assisted with Programming Languages and Compilers course (300 students)

Teaching Assistant, Dept. of Computer Science, Virginia Tech, 1998-2000
Graded assignments and exams, held office hours, and taught lab sections
Assisted with Object-Oriented Software Design and Construction and Numerical Methods courses

SELECTED HONORS, AWARDS, AND FELLOWSHIPS

Computational Science and Engineering Fellow, University of Illinois, 2002-03, 2003-04 (10 awarded per year)
Outstanding Graduate Teaching Award, Department of Computer Science, Virginia Tech, 2000
Barry M. Goldwater Scholar, 1997-98 (300 awarded nationally per year)
Phi Beta Kappa, 1997
Upsilon Pi Epsilon Computer Science Honor Society, 1997
Sigma Pi Sigma Physics Honor Society, 1997

PUBLICATIONS

Journal Articles

- M. L. Parks, E. de Sturler, G. Mackey, D. Johnson, and S. Maiti, "Recycling Krylov Subspaces for Sequences of Linear Systems", Accepted for publication in *SIAM Journal on Scientific Computation* February 2006, Also available as University of Illinois Technical Report UIUCDCS-R-2004-2421.

Technical Reports

- M. L. Parks, L. A. Romero, and J. Whiting. "A Reduced Order Model for the Study of Asymmetries in Linear Gas Chromatography for Homogeneous Tubular Columns", Technical Report SAND2005-4868, Sandia National Laboratories, August 2005.
- M. L. Parks. "The Iterative Solution of a Sequence of Linear Systems Arising From Nonlinear Finite Element Analysis", Ph.D. Dissertation, Dept. of Computer Science at the University of Illinois at Urbana-Champaign, 2005. Available as University of Illinois Technical Report UIUCDCS-R-2005-2497.
- M. L. Parks. "Efficient Numeric Computation of a Phase Diagram in Biased Diffusion of Two Species", Master's Thesis, Dept. of Physics at the Virginia Polytechnic Institute and State University (Virginia Tech), 2000. Available as Virginia Tech Electronic Thesis etd-05172000-14430029.

Other

- M. L. Parks, R. B. Lehoucq. "Researchers Discuss Atomistic-to-Continuum (AtC) Coupling". *SIAM News*, Vol. 39, No. 7 (September 2006).

Work In Progress

- M. L. Parks, P. B. Bochev, and R. B. Lehoucq. "Connections Between Domain Decomposition and Atomistic-to-Continuum (AtC) Coupling".
- M. L. Parks and E. de Sturler. "Analysis of Krylov Subspace Recycling for Sequences of Linear Systems".
- P. B. Bochev, M. L. Parks, and L. A. Romero. "A Generalized Lagrange Multiplier Method for Mesh Tying".
- M. L. Parks, L. A. Romero. "Taylor-Aris Dispersion in High Aspect Ratio Columns of Nearly Rectangular Cross-Section".

PRESENTATIONS

- "Fast Solution of Long Sequences of Linear Systems in Computational Mechanics", 7th World Congress on Computational Mechanics, Los Angeles, CA., July 16-22, 2006.
- "Relating Atomistic-to-Continuum Coupling and Domain Decomposition", 7th World Congress on Computational Mechanics, Los Angeles, CA., July 16-22, 2006.
- "Analysis of Krylov Subspace Recycling for Sequences of Linear Systems", SIAM Conference on Computational Science and Engineering, Orlando, FL., February 12-15 2005.
- "Analysis of Krylov Subspace Recycling for Sequences of Linear Systems", 7th IMACS International Symposium of Iterative Methods in Scientific Computing, Toronto, Canada, May 5-6 2005.
- "Recycling Krylov Subspaces for Sequences of Linear Systems", Annual Computational Science and Engineering Research Symposium, University of Illinois, April 27, 2004.
- "Recycling Krylov Subspaces for Sequences of Linear Systems", Midwest Numerical Analysis Day, University of Wisconsin-Milwaukee, April 24, 2004.
- "Improved Krylov Methods and a Framework for the Analysis of Preconditioners for Ill-Conditioned Equations Arising from Nonlinear Finite Element Analysis", 2003 International Conference On Preconditioning Techniques For Large Sparse Matrix Problems In Scientific And Industrial Applications, Napa, CA., October 27-29, 2003.
- "Robust Preconditioners and Solvers for Ill-Conditioned Equations from Nonlinear Finite Element Analysis", Annual Computational Science and Engineering Research Symposium, UIUC, April 25, 2003.

SANDIA PROJECTS

Analysis of Atomistic-to-Continuum (AtC) Coupling
Finding: MICS
Activities: Numerical analysis of atomistic-to-continuum coupling algorithms.
Collaborators : Lehoucq, Bochev, Gunzburger (FSU), Estep (CSU), Fish (RPI), and Shephard (RPI)

A Mathematical Framework for Multiscale Science and Engineering
Funding: LDRD
Activities: Development and analysis of atomistic/continuum thermal coupling algorithms .
Collaborators : Lehoucq, Bochev, Slepoy, and Wagner

Mesh Tying (for finite element subdomains with inconsistently meshed boundaries)
Funding: CSRF
Activities: Development and analysis of mesh tying algorithms.
Collaborators : Bochev, Day, Romero, and Gee

System Level Methods for Electrical and Microsystems Applications (Co-PI)
Funding: CSRF
Activities: Research on Krylov Subspace Recycling algorithms; Trilinos development.
Collaborators : Keiter, Day, Coffey, Hoekstra, and Bartlett

SANDIA PROPOSALS SUBMITTED

System Level Methods for Electrical and Microsystems Applications (Co-PI)
Funding Requested: $1.5M (CSRF)
Status: Funded

Engineered Novel Micro Gas Chromatography Columns for Mission Critical Applications
Funding Requested: $140k for 6 months (NINE Latestart LDRD)
Status: Not funded.

SANDIA SERVICE

- **Organizer, NECIS Special Seminar Series** (hosted university faculty for talks on predictive science for nanotechnology)

PROFESSIONAL ACTIVITIES

Member, Society for Industrial and Applied Mathematics (SIAM)
Reviewer for SIAM Journal on Numerical Analysis (SINUM), SIAM Review (SIREV) and Electronic Transactions on Numerical Analysis (ETNA)

REFERENCES

Available upon request.